WHAT IS CLAIMED IS:

1. An interferometer using an optical waveguide,
which is formed by embedding a core that has a

5 refractive index higher than that of a cladding into
the cladding on a substrate, said interferometer
comprising:
        at least two types of annealing regions that are
provided near the optical waveguide, wherein

10   an optical path length of said optical waveguide
is trimmed by changing an effective refractive index
of said optical waveguide by applying annealing to
said annealing regions.

15 2. The interferometer as claimed in claim 1, wherein
said annealing regions differ in their width.

3. The interferometer as claimed in claim 1, wherein
said annealing regions differ in their distances from

20 said optical waveguide to said annealing regions.

4. The interferometer as claimed in claim 1, wherein
said annealing regions differ in presence or absence
of a slit formed in said annealing regions in an

25 optical waveguide direction, or in slit width.

5. The interferometer as claimed in claim 1, wherein

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said annealing regions differ in presence or absence
of a trench formed by partially removing a cladding
around said optical waveguide, or in distance from
said optical waveguide to trenches, or in depth of the
5 trenches.

6. The interferometer as claimed in claim 1, wherein
said annealing regions each consist of a thin film
heater formed on said optical waveguide.
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7. The interferometer as claimed in claim 1, further
comprising fixed delay means for providing delay
dependent on a polarization state.

15 8. The interferometer as claimed in claim 1, wherein
said interferometer comprises at least one optical
coupler and a plurality of optical waveguides
connected to said optical coupler.

20 9. The interferometer as claimed in claim 8, wherein
said interferometer comprises two 2×2 optical
couplers and two optical waveguides connecting said
optical couplers, wherein
    optical path length difference (delay difference)
25 between said two optical waveguides is trimmed by
local annealing such that the optical path length
difference is an odd multiple of $\lambda/2$ for a transverse

electric polarization mode and an even multiple of $\lambda/2$
for a transverse magnetic polarization mode, where
λ is a wavelength, or that it is an even multiple of
$\lambda/2$ for the transverse electric polarization mode and
5   an odd multiple of $\lambda/2$ for the transverse magnetic
polarization mode.

10. The interferometer as claimed in claim 9, wherein
at least one of said two optical waveguides connecting
10   said two 2×2 optical couplers comprises polarization
dependent fixed delay means.

11. The interferometer as claimed in claim 2, wherein
at least one of said annealing regions has a width
15   equal to or greater than 2.6 times a distance d from a
core center to a top surface of the cladding, or at
least one of said annealing regions has a width equal
to or less than 1.4 times the distance from the core
center to the top surface of the cladding.

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12. The interferometer as claimed in claim 2, further
comprising fixed delay means for providing delay
dependent on a polarization state.

25   13. The interferometer as claimed in claim 2, wherein
said interferometer comprises at least one optical
coupler and a plurality of optical waveguides

connected to said optical coupler.

14. The interferometer as claimed in claim 6, further comprising fixed delay means for providing delay
5 dependent on a polarization state.

15. The interferometer as claimed in claim 6, wherein said interferometer comprises at least one optical coupler and a plurality of optical waveguides
10 connected to said optical coupler.

16. The interferometer as claimed in claim 6, wherein said annealing regions differ in their width.

15 17. The interferometer as claimed in claim 6, wherein said annealing regions differ in presence or absence of a trench formed by partially removing a cladding around said optical waveguide, or in distance from said optical waveguide to trenches, or in depth of the
20 trenches.

18. A fabrication method of an interferometer comprising the steps of:
 forming an optical waveguide having a core that
25 has a refractive index higher than that of a cladding and is embedded into the cladding on a substrate;
 forming at least two types of thin film heaters

on said optical waveguide; and

trimming an optical path length of said optical
waveguide by changing an effective refractive index of
said optical waveguide by locally annealing a
5   neighborhood of said optical waveguide by said thin
film heaters.

19. An interferometer using an optical waveguide,
which is formed by embedding a core that has a
10   refractive index higher than that of a cladding into
the cladding on a substrate, said interferometer
comprising:

one type of annealing region that has a width
from 1.4 to 2.6 times a distance from the optical
15   waveguide to a top surface of said cladding in a
neighborhood of said optical waveguide, wherein

an optical path length of said optical waveguide
is trimmed by changing an effective refractive index
of said optical waveguide by applying annealing to
20   said annealing region.

20. A fabrication method of an interferometer
comprising the steps of:

forming an optical waveguide including a core
25   that has a refractive index higher than that of a
cladding and is embedded into the cladding on a
substrate;

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forming one type of thin film heater that has a
width from 1.4 to 2.6 times a distance from the
optical waveguide to a top surface of said cladding in
a neighborhood of said optical waveguide; and

5   trimming an optical path length of said optical
waveguide by changing an effective refractive index of
said optical waveguide by applying annealing to said
annealing region.